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HEALTH EFFECTS DIVISION
SCIENTIFIC DATA REVIEWS
EPA SERIES 501

OFFICE OF
PREVENTION, PESTICIDES, AND
TOXIC SUBSTANCES

MEMORANDUM

DATE: 31-JUL-2000

SUBJECT: PP#s 8F04973, 9F05096, 9F06007, 9E06003, and 00ND0025. Glyphosate in/on Various Commodities: **Chronic Dietary Exposure Analysis.** Chemical#s: 417300 & 103601. DP Barcode: D267589.

FROM: William H. Donovan, Ph.D., Chemist *William H. Donovan*
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Health Effects Division (HED) (7509C)

THROUGH: Sarah J. Levy, Chemist *Sarah J. Levy*
Sherrie Kinard, Chemist *Sherrie J. Kinard*
Dietary Exposure Science Advisory Council Reviewers

G. Jeffrey Herndon, Acting Branch Senior Scientist
RAB1/HED (7509C) *G. Jeffrey Herndon*

TO: William Dykstra, Ph.D., Toxicologist
RAB1/HED (7509C)

Executive Summary

Dietary Exposure Evaluation Model (DEEM™) analysis indicates that the chronic dietary risk associated with the published and proposed uses of glyphosate is below the HED's level of concern for chronic exposure scenarios. The chronic analysis presented here is highly conservative, making use of tolerance level residues and 100% crop treated assumptions (Tier 1 analysis).

Action Requested

Provide an estimate of the chronic dietary exposure and associated risk for glyphosate resulting from existing tolerances and the proposed new uses from petitions 8F04973, 9F05096, and 9F06007 submitted by Monsanto Company, and petition 9E06003 submitted by the Interregional Research Project Number 4 (IR-4). Additionally, based on field trial data from a preharvest use

of glyphosate for control of Canada thistle and sowthistle gathered in support of a Section 18 request (00ND0025), a tolerance level of 4.0 ppm for glyphosate in/on “flax, seed” should be included.

The recommended tolerance levels resulting from the above petitions are as follows:

Raw Agricultural Commodity (RAC)	Recommended Tolerance (ppm)	RAC	Recommended Tolerance (ppm)
Alfalfa, forage	175	Leucaena, forage	200
Alfalfa, hay	400	Ligonberry	0.2
Aloe vera	0.5	Mamey apple	0.2
Ambarella	0.2	Meadowfoam, seed	0.1
Artichoke, globe	0.2	Mioga, flower	0.2
Bamboo, shoots	0.2	Mustard, seed	0.1
Berry group	0.2	Nut, pine	1.0
Biriba	0.2	Okra	0.5
Betelnut	1.0	Oregano, Mexican, leaves	2.0
Blimbe	0.2	Palm heart, leaves	0.2
Borage, seed	0.1	Papaya, mountain	0.2
Cactus, fruit	0.5	Pawpaw	0.2
Cactus, pads	0.5	Pepper leaf, fresh leaves	0.2
Chaya	1.0	Perilla, tops	1.8
Corn, field, forage	3.0	Poultry, meat byproducts	1.0
Crambe, seed	0.1	Pulasan	0.2
Custard apple	0.2	Quinoa, grain	5.0
Dokudami	2.0	Rapeseed, seed	10
Egg	0.05	Rapeseed, meal	15
Epazpote	1.3	Rose apple	0.2
Feijoa	0.2	Safflower, seed	0.1
Flax, seed	4.0	Salal	0.2
Galangal, roots	0.2	Sesame, seed	0.1
Ginger, white, flower	0.2	Spanish lime	0.2

Gourd, buffalo, seed	0.1	Spices subgroup	7.0
Governor's Plum	0.2	Star apple	0.2
Gow Kee, leaves	0.2	Stevia, dried leaves	1.0
Grain, cereal, stover and straw, group	100	Surinam cherry	0.2
Herbs subgroup	2.0	Teff, grain	5.0
Hop, dried cones	7.0	Ti, leaves	0.2
Ilama	0.2	Ti, roots	0.2
Imbe	0.2	Ugli fruit	0.5
Imbu	0.2	Wasabi, roots	0.2
Jojoba, seed	0.1	Water spinach, tops	0.2
Juneberry	0.2	Watercress, upland	0.2
Kava, roots	0.2	Wax jambu	0.2
Kenaf, forage	200	Yacon, tuber	0.2
Lesquerella, seed	0.1	Flax, meal	8.0

A previous chronic dietary exposure analysis incorporating all available tolerances using the DEEM™ program was completed on 22-FEB-1999 (D253416, T. Bloem), showing that the most highly exposed population subgroup occupied < 4% of the RfD.

Toxicological Endpoints

Acute

A review of the rat and rabbit developmental studies did not provide a dose or endpoint that could be used for acute dietary risk purposes. Additionally, there were no data requirements for acute or subchronic rat neurotoxicity studies since there was no evidence of neurotoxicity in any of the toxicology studies at very high doses and glyphosate lacks a leaving group (HED Doc. No. 012586, W. Dykstra & J. Rowland, 20-APR-1998). Thus, no acute dietary exposure analysis is needed for glyphosate.

Chronic

The chronic Reference Dose (cRfD) for regulatory purposes is 2.0 mg/kg/day. The Hazard Identification Assessment Review Committee (HIARC) selected a NOAEL of 175 mg/kg/day based on death, diarrhea, and nasal discharge in Dutch Belted rabbits at 350 mg/kg/day (LOAEL) (HED Doc. No. 012586, W. Dykstra & J. Rowland, 20-APR-1998). An uncertainty factor (UF) of 100 was applied to account for both the interspecies extrapolation and intra-species variability.

FQPA Recommendation

The population adjusted dose (PAD) is a modification of the acute RfD or chronic RfD to accommodate the FQPA Safety Factor. The chronic PAD (cPAD) is equal to the cRfD divided by the FQPA Safety Factor: $cPAD = cRfD/FQPA\ Safety\ Factor$. The FQPA Safety Factor Committee (SFC) recommended that the 10x factor to account for enhanced sensitivity of infants and children be removed (HED Doc. No. 012584, B. Tarplee and J. Rowland, 17-APR-1998).

Since the HED FQPA SFC determined to remove the 10X Safety Factor, the cRfD is identical to the cPAD (2.0 mg/kg/day).

Cancer

The Cancer Peer Review Committee classified glyphosate as a "Group E" pesticide [no evidence for carcinogenicity in two acceptable studies](HED Doc. No. 012586, W. Dykstra & J. Rowland, 20-APR-1998). Therefore, a cancer dietary exposure analysis was not conducted.

The following table of toxicological endpoints was taken from the report of the Hazard Identification Assessment Review Committee (HIARC) (HED Doc. No. 012586, W. Dykstra & J. Rowland, 20-APR-1998).

Table 1. Summary of Toxicological Endpoints for Glyphosate.

EXPOSURE SCENARIO	DOSE (mg/kg/day)	ENDPOINT	STUDY
Acute Dietary	None	No toxicological endpoint attributable to a single dose was identified in oral studies including the rat and rabbit developmental toxicity studies.	
	Acute RfD = None		
Chronic Dietary	NOEL = 175 UF = 100	Mortality, diarrhea, and nasal discharge	Developmental - Rabbit
		Chronic RfD = 2.0 mg/kg/day	
Short-, Intermediate and Long-Term (Dermal)	None	No systemic toxic effects seen at doses up to 1000 mg/kg/day in the 21 day dermal toxicity study. Risk assessment is not required.	
Inhalation (Any Time Period)	None	Based on low toxicity of formulations and technical material [wet cake] inhalation study was waived. Risk assessment is not required.	

Residue Information

Permanent tolerances for glyphosate residues are listed under 40 CFR §180.364. The current proposals for glyphosate tolerances were based on crop field trial data if available and data translation otherwise (D262424, W. Donovan, 18-JAN-2000; D256740, W. Donovan, 09-JUN-2000; D256742, W. Donovan, 23-JUN-2000; D245594, W. Donovan, 29-JUN-2000). The present analysis was made using recommended tolerance-level residues and a 100% crop treated assumption (Tier 1 approach) for those commodities with proposed new tolerances together with commodities having existing tolerances that are included in the DEEM™ program. A full listing of the residue information used in the chronic analysis is given in Attachment 1.

Results

Chronic Analysis

DEEM™ analysis evaluated the individual food consumption as reported by respondents in the USDA 1989-92 nationwide Continuing Surveys for Food Intake by Individuals (CSFII) and accumulated exposure to the chemical for each commodity. HED's level of concern is for exposures >100% cPAD. The chronic DEEM™ analysis used mean consumption (3 day average) data and gave the results listed in Table 2:

Table 2. Summary of Results from Chronic DEEM™ Analysis of Glyphosate.

Subgroups	Exposure (mg/kg/day)	% cPAD
U.S. Population (48 states)	0.030074	1.5
All infants (< 1 year)	0.061663	3.1
Children (1-6 years old)	0.064651	3.2
Children (7-12 years old)	0.043174	2.2
Females 13-50 yrs.	0.022340	1.1
Males 13-19 yrs.	0.030281	1.5
Seniors 55+	0.021805	1.1

The population subgroups listed in Table 2 include those subgroups having sufficient numbers of survey respondents in the CSFII food consumption survey to be considered statistically reliable. The complete chronic analysis is attached (see Attachment 2).

Conclusion

The results of this analysis indicate that the estimated chronic dietary risk associated with existing and recommended uses of glyphosate is below the HED's level of concern.

Attachments

Attachment 1: Glyphosate Tier 1 residue file for chronic DEEM™ analysis.

Attachment 2: Glyphosate Chronic DEEM™ analysis.

cc: W. Donovan (RAB1); M. Sahafeyen (CEB1)
RDI: S. Levy (27-JUL-2000), S. Kinard (27-JUL-2000)
W. Donovan:CM#2: 806-R:(703)305-7330:27-JUL-2000

Attachment 1. Glyphosate residue file for chronic DEEM™ analysis.

U.S. Environmental Protection Agency
 DEEM Chronic analysis for GLYPHOSATE
 Residue file: C:\deemepa\417300.rs7
 Analysis Date 07-27-2000 Residue file dated: 07-27-2000/13:24:12/8
 Reference dose (RfD) = 2 mg/kg bw/day
 Comment: 8F04973, 9F05096, 9F06007, 9E06003, and 00ND0025

Food	Crop		RESIDUE	Adj_Factors	Comment
Code	Grp	Food Name	(ppm)	#1 #2	
1	13A	Blackberries	0.200000	1.000 1.000 P	3E2930
2	13A	Boysenberries	0.200000	1.000 1.000 P	3E2930
3	13A	Dewberries	0.200000	1.000 1.000 P	3E2930
4	13A	Loganberries	0.200000	1.000 1.000 P	3E2930
5	13A	Raspberries	0.200000	1.000 1.000 P	3E2930
6	13A	Youngberries	0.200000	1.000 1.000 P	3E2930
7	13B	Blueberries	0.200000	1.000 1.000 P	3E2930
8	0	Cranberries	0.200000	1.000 1.000 P	0E2421
9	0	Cranberries-juice	0.200000	1.100 1.000 P	0E2421
10	13B	Currants	0.200000	1.000 1.000 P	3E2930
11	13B	Elderberries	0.200000	1.000 1.000 P	3E2930
12	13B	Gooseberries	0.200000	1.000 1.000 P	3E2930
13	0	Grapes	0.200000	1.000 1.000 P	5F1560
14	0	Grapes-raisins	0.200000	4.300 1.000 P	5F1560
15	0	Grapes-juice	0.200000	1.200 1.000 P	5F1560
16	13B	Huckleberries	0.200000	1.000 1.000 P	3E2930
17	0	Strawberries	0.200000	1.000 1.000 P	3E2930
18	0	Juneberry	0.200000	1.000 1.000 N	9E6003
20	10	Citrus citron	0.500000	1.000 1.000 P	4F4338
22	10	Grapefruit-peeled fruit	0.500000	1.000 1.000 P	4F4338
23	10	Grapefruit-juice	0.500000	2.100 1.000 P	4F4338
24	10	Kumquats	0.500000	1.000 1.000 P	4F4338
26	10	Lemons-peeled fruit	0.500000	1.000 1.000 P	4F4338
27	10	Lemons-peel	0.500000	1.000 1.000 P	4F4338
28	10	Lemons-juice	0.500000	2.000 1.000 P	4F4338
30	10	Limes-peeled fruit	0.500000	1.000 1.000 P	4F4338
31	10	Limes-peel	0.500000	1.000 1.000 P	4F4338
32	10	Limes-juice	0.500000	2.000 1.000 P	4F4338
33	10	Oranges-juice-concentrate	0.500000	6.700 1.000 P	4F4338
34	10	Oranges-peeled fruit	0.500000	1.000 1.000 P	4F4338
35	10	Oranges-peel	0.500000	1.000 1.000 P	4F4338
36	10	Oranges-juice	0.500000	1.800 1.000 P	4F4338
37	10	Tangelos	0.500000	1.000 1.000 P	4F4338
38	10	Tangerines	0.500000	1.000 1.000 P	4F4338
39	10	Tangerines-juice	0.500000	2.300 1.000 P	4F4338
40	14	Almonds	1.000000	1.000 1.000 P	7F1893
41	14	Brazil nuts	1.000000	1.000 1.000 P	7F1893
42	14	Cashews	1.000000	1.000 1.000 P	7F1893
43	14	Chestnuts	1.000000	1.000 1.000 P	7F1893
44	14	Filberts (hazelnuts)	1.000000	1.000 1.000 P	7F1893
45	14	Hickory nuts	1.000000	1.000 1.000 P	7F1893
46	14	Macadamia nuts (bush nuts)	1.000000	1.000 1.000 P	7F1893
47	14	Pecans	1.000000	1.000 1.000 P	7F1893
48	14	Walnuts	1.000000	1.000 1.000 P	7F1893
49	14	Butter nuts	1.000000	1.000 1.000 P	7F1893
50	0	Pistachio nuts	1.000000	1.000 1.000 N	9E6003
51	14	Beech-nuts	1.000000	1.000 1.000 P	7F1893
52	11	Apples	0.200000	1.000 1.000 P	6F1861
53	11	Apples-dried	0.200000	8.000 1.000 P	6F1861
54	11	Apples-juice/cider	0.200000	1.300 1.000 P	6F1861
55	11	Crabapples	0.200000	1.000 1.000 P	6F1861
56	11	Pears	0.200000	1.000 1.000 P	6F1861
57	11	Pears-dried	0.200000	6.250 1.000 P	6F1861
58	11	Quinces	0.200000	1.000 1.000 P	6F1861
59	12	Apricots	0.200000	1.000 1.000 P	260044

60	12	Apricots-dried	0.200000	6.000	1.000	P	260044
61	12	Cherries	0.200000	1.000	1.000	P	260044
62	12	Cherries-dried	0.200000	4.000	1.000	P	260044
63	12	Cherries-juice	0.200000	1.500	1.000	P	260044
64	12	Nectarines	0.200000	1.000	1.000	P	260044
65	12	Peaches	0.200000	1.000	1.000	P	260044
66	12	Peaches-dried	0.200000	7.000	1.000	P	260044
67	12	Plums (damsons)	0.200000	1.000	1.000	P	260044
68	12	Plums-prunes (dried)	0.200000	5.000	1.000	P	260044
69	12	Plums/prune- juice	0.200000	1.400	1.000	P	260044
70	0	Avocados	0.200000	1.000	1.000	P	8F2021
72	0	Bananas	0.200000	1.000	1.000	P	9F2223
73	0	Bananas-dried	0.200000	3.900	1.000	P	9F2223
74	0	Coconut	0.100000	1.000	1.000	P	2F2680
75	0	Coconut-dried (copra)	0.100000	2.100	1.000	P	2F2680
76	0	Coconut-water	0.100000	1.000	1.000	P	2F2680
77	0	Dates	0.200000	1.000	1.000	P	9E3754
78	0	Figs	0.200000	1.000	1.000	P	3E2929
79	0	Guava	0.200000	1.000	1.000	P	1E2443
80	0	Mangoes	0.200000	1.000	1.000	P	1E2490
81	11	Loquats	0.200000	1.000	1.000	P	6F1861
82	0	Olives	0.200000	1.000	1.000	P	3E2929
84	0	Papayas-pulp	0.200000	1.000	1.000	P	1E2443
85	0	Papayas-dried	0.200000	1.800	1.000	P	1E2443
86	0	Papayas- juice	0.200000	1.500	1.000	P	1E2443
87	0	Pawpaws	0.200000	1.000	1.000	N	9E6003
88	0	Persimmons	0.200000	1.000	1.000	P	9E3754
89	0	Pineapples-peeled fruit	0.100000	1.000	1.000	P	2F2634
90	0	Pineapples-dried	0.100000	5.000	1.000	P	2F2634
91	0	Pineapples- juice	0.100000	1.700	1.000	P	2F2634
92	0	Passion fruit (granadilla)	0.200000	1.000	1.000	P	9E3715
93	0	Pomegranates	0.200000	1.000	1.000	P	1E3978
94	0	Plantains-ripe	0.200000	1.000	1.000	P	9F2223
95	0	Lychees (litchi)/fresh	0.200000	1.000	1.000	P	9E3715
96	0	Lychee-dried	0.200000	1.850	1.000	P	9E3715
97	0	Kiwi fruit	0.200000	1.000	1.000	P	3E2929
98	0	Acerola	0.200000	1.000	1.000	P	3E2929
100	0	Maney (mam mee apple)	0.200000	1.000	1.000	N	9E6003
101	0	Pitanga (surinam cherry)	0.200000	1.000	1.000	N	9E6003
102	0	Soursop (annona muricata)	0.200000	1.000	1.000	P	9E3754
103	0	Sugar apples (sweetsop)	0.200000	1.000	1.000	P	6E3424
104	0	Bread fruit	0.200000	1.000	1.000	P	9E3754
106	0	Carambola (starfruit)	0.200000	1.000	1.000	P	6E3424
107	0	Cherimoya	0.200000	1.000	1.000	P	OE3881
108	0	Longan fruit	0.200000	1.000	1.000	P	9E3715
109	0	Genip (spanish lime)	0.200000	1.000	1.000	P	OE3873
110	0	Chocolate-cocoa butter	0.200000	1.000	1.000	P	OE3857
111	0	Chocolate	0.200000	1.000	1.000	P	OE3857
112	0	Coffee	1.000000	1.000	1.000	P	6E1809
113	0	Tea	7.000000	1.000	1.000	P	1H5310 & 8H5568
114	1AB	Chicory	0.200000	1.000	1.000	P	7F2016
115	19B	Anise	7.000000	1.000	1.000	N	9E6003
116	19A	Basil	2.000000	1.000	1.000	N	9E6003
117	19B	Caraway	7.000000	1.000	1.000	N	9E6003
118	19B	Cassia	7.000000	1.000	1.000	N	9E6003
119	19B	Cinnamon	7.000000	1.000	1.000	N	9E6003
120	19B	Clove	7.000000	1.000	1.000	N	9E6003
121	19B	Coriander	7.000000	1.000	1.000	N	9E6003
122	19B	Cumin	7.000000	1.000	1.000	N	9E6003
123	19A	Dill	2.000000	1.000	1.000	N	9E6003
124	1CD	Ginger	0.200000	1.000	1.000	P	7F2016
125	0	Hops	7.000000	1.000	1.000	N	9E6003
126	1AB	Horseradish	0.200000	1.000	1.000	P	8E3676
127	19A	Rosemary	2.000000	1.000	1.000	N	9E6003
128	19A	Marjoram	2.000000	1.000	1.000	N	9E6003
129	19A	Oregano	2.000000	1.000	1.000	N	9E6003
130	19B	Mustard seed	7.000000	1.000	1.000	N	9E6003
131	19B	Nutmeg	7.000000	1.000	1.000	N	9E6003

132	19B	Mace	7.000000	1.000	1.000	N	9E6003
133	19A	Sage	2.000000	1.000	1.000	N	9E6003
134	19A	Savory	2.000000	1.000	1.000	N	9E6003
135	19A	Bay	2.000000	1.000	1.000	N	9E6003
136	19A	Thyme	2.000000	1.000	1.000	N	9E6003
137	1CD	Turmeric	0.200000	1.000	1.000	P	7F2016
138	19B	Allspice	7.000000	1.000	1.000	N	9E6003
139	8	Paprika	0.100000	1.000	1.000		
140	19B	Poppy	7.000000	1.000	1.000	N	9E6003
141	9A	Melons-cantaloupes-juice	0.500000	1.000	1.000	P	3E2845
142	9A	Melons-cantaloupes-pulp	0.500000	1.000	1.000	P	3E2845
143	9A	Casabas	0.500000	1.000	1.000	P	3E2845
144	9A	Crenshaws	0.500000	1.000	1.000	P	3E2845
145	9A	Melons-honeydew	0.500000	1.000	1.000	P	3E2845
146	9A	Melons-persian	0.500000	1.000	1.000	P	3E2845
147	9A	Watermelon	0.500000	1.000	1.000	P	3E2845
148	9B	Cucumbers	0.500000	1.000	1.000	P	3E2845
149	9B	Pumpkin	0.500000	1.000	1.000	P	3E2845
150	9B	Squash-summer	0.500000	1.000	1.000	P	3E2845
151	9B	Squash-winter	0.500000	1.000	1.000	P	3E2845
152	9B	Bitter melon	0.500000	1.000	1.000	P	3E2845
153	0	Towlgourd	0.500000	1.000	1.000	P	3E2845
154	8	Eggplant	0.100000	1.000	1.000		
155	8	Peppers-sweet(garden)	0.100000	1.000	1.000		
156	8	Peppers-chilli incl jalapeno	0.100000	1.000	1.000		
157	8	Peppers-other	0.100000	1.000	1.000		
158	8	Pimientos	0.100000	1.000	1.000		
159	8	Tomatoes-whole	0.100000	1.000	1.000		
160	8	Tomatoes-juice	0.100000	1.500	1.000		
161	8	Tomatoes-puree	0.100000	3.300	1.000		
162	8	Tomatoes-paste	0.100000	5.400	1.000		
163	8	Tomatoes-catsup	0.100000	2.500	1.000		
164	8	Groundcherries	0.100000	1.000	1.000		
165	2	Beets-garden-tops(greens)	0.200000	1.000	1.000	P	8E2122
166	4B	Celery	0.200000	1.000	1.000	P	8E2122
167	4A	Chicory(french/belgian endive)	0.200000	1.000	1.000	P	7F2016 & 8E2122
168	5A	Broccoli	0.200000	1.000	1.000	P	8E2122
169	5A	Brussels sprouts	0.200000	1.000	1.000	P	8E2122
170	5A	Cabbage-green and red	0.200000	1.000	1.000	P	8E2122
171	5A	Cauliflower	0.200000	1.000	1.000	P	8E2122
172	5B	Collards	0.200000	1.000	1.000	P	8E2122
174	5B	Kale	0.200000	1.000	1.000	P	8E2122
175	5A	Kohlrabi	0.200000	1.000	1.000	P	8E2122
176	4A	Lettuce-leafy varieties	0.200000	1.000	1.000	P	8E2122
177	4A	Dandelion-greens	0.200000	1.000	1.000	P	8E2122
178	4A	Endive-curley and escarole	0.200000	1.000	1.000	P	8E2122
179	19B	Fennel	7.000000	1.000	1.000	N	9E6003
180	4A	Cress-garden/field	0.200000	1.000	1.000	P	8E2122
181	0	Artichokes-globe	0.200000	1.000	1.000	N	9E6003
182	4A	Lettuce-unspecified	0.200000	1.000	1.000	P	8E2122
183	5B	Mustard greens	0.200000	1.000	1.000	P	8E2122
184	4A	Parsley	0.200000	1.000	1.000	P	8E2122
185	4B	Rhubarb	0.200000	1.000	1.000	P	8E2122
186	4A	Spinach	0.200000	1.000	1.000	P	8E2122
187	4B	Swiss chard	0.200000	1.000	1.000	P	8E2122
188	2	Turnips-tops	0.200000	1.000	1.000	P	8E2122
189	0	Watercress	0.200000	1.000	1.000	N	9E6003
190	2	Taro-greens	0.200000	1.000	1.000	P	8E2122
191	4A	Cress-upland	0.200000	1.000	1.000	P	8E2122
192	4A	Lettuce-head varieties	0.200000	1.000	1.000	P	8E2122
194	0	Cactus pads (nopal)	0.500000	1.000	1.000	N	9E6003
197	1AB	Beets-garden-roots	0.200000	1.000	1.000	P	7F2016
198	1AB	Carrots	0.200000	1.000	1.000	P	8E3676
199	1AB	Celeriac	0.200000	1.000	1.000	P	1E4010
200	19A	Chives	2.000000	1.000	1.000	N	9E6003
201	1CD	Taro-root	0.200000	1.000	1.000	P	7F2016
202	3	Garlic	0.200000	1.000	1.000	P	8E3676
203	1CD	Artichokes-jerusalem	0.200000	1.000	1.000	P	7F2016

204	3	Leeks	0.200000	1.000	1.000	P	8E3676
205	3	Onions-dry-bulb (cipollini)	0.200000	1.000	1.000	P	8E3676
206	3	Onions-dehydrated or dried	0.200000	9.000	1.000	P	8E3676
207	1C	Potatoes/white-whole	0.200000	1.000	1.000	P	7F2016
208	1C	Potatoes/white-unspecified	0.200000	1.000	1.000	P	7F2016
209	1C	Potatoes/white-peeled	0.200000	1.000	1.000	P	7F2016
210	1C	Potatoes/white-dry	0.200000	6.500	1.000	P	7F2016
211	1C	Potatoes/white-peel only	0.200000	1.000	1.000	P	7F2016
212	1AB	Radishes-roots	0.200000	1.000	1.000	P	7F2016
213	2	Radishes-tops	0.200000	1.000	1.000	P	7F2016
214	1AB	Rutabagas-roots	0.200000	1.000	1.000	P	7F2016
215	2	Rutabagas-tops	0.200000	1.000	1.000	P	7F2016
216	1AB	Salsify(oyster plant)	0.200000	1.000	1.000	P	7F2016
217	3	Shallots	0.200000	1.000	1.000	P	8E3676
218	1CD	Sweet potatoes (incl yams)	0.200000	1.000	1.000	P	7F2016
219	1AB	Turnips-roots	0.200000	1.000	1.000	P	7F2016
220	1AB	Parsnips	0.200000	1.000	1.000	P	7F2016
221	1CD	Yam-bean tuber (jicama)	0.200000	1.000	1.000	P	7F2016
222	1CD	Cassava (yuca blanca)	0.200000	1.000	1.000	P	7F2016
224	1CD	Yautia (tuber)	0.200000	1.000	1.000	P	7F2016
225	1AB	Parsley roots	0.200000	1.000	1.000	P	7F2016
227	6C	Beans-dry-great northern	5.000000	1.000	1.000	P	2E4118
228	6C	Beans-dry-kidney	5.000000	1.000	1.000	P	2E4118
229	6C	Beans-dry-lima	5.000000	1.000	1.000	P	2E4118
230	6C	Beans-dry-navy (pea)	5.000000	1.000	1.000	P	2E4118
231	6C	Beans-dry-other	5.000000	1.000	1.000	P	2E4118
232	6C	Beans-dry-pinto	5.000000	1.000	1.000	P	2E4118
233	6B	Beans-succulent-lima	5.000000	1.000	1.000	P	2E4118
234	6A	Beans-succulent-green	5.000000	1.000	1.000	P	2E4118
235	6A	Beans-succulent-other	5.000000	1.000	1.000	P	2E4118
236	6A	Beans-succulent-yellow/wax	5.000000	1.000	1.000	P	2E4118
237	15	Corn/pop	0.100000	1.000	1.000	P	8E2122
238	15	Corn/sweet	0.100000	1.000	1.000	P	8E2122
240	6C	Peas (garden)-dry	5.000000	1.000	1.000	P	2E4118
241	6AB	Peas (garden)-green	5.000000	1.000	1.000	P	2E4118
243	6C	Lentils	5.000000	1.000	1.000	P	2E4118
244	6C	Mung beans (sprouts)	5.000000	1.000	1.000	P	2E4118
245	0	Okra	0.500000	1.000	1.000	N	9E6003
249	6C	Beans-dry-broadbeans	5.000000	1.000	1.000	P	2E4118
250	6B	Beans-succulent-broadbeans	5.000000	1.000	1.000	P	2E4118
251	6C	Beans-dry-pigeon beans	5.000000	1.000	1.000	P	2E4118
252	0	Sesame seeds	0.100000	1.000	1.000	N	9E6003
253	6	Beans-unspecified	5.000000	1.000	1.000	P	2E4118
254	0	Pine nuts	1.000000	1.000	1.000	N	9E6003
255	6A	Soybeans-sprouted seeds	20.000000	0.330	1.000	P	5F1536
256		Beans-dry-hyacinth	5.000000	1.000	1.000	P	2E4118
257		Beans-succulent-hyacinth	5.000000	1.000	1.000	P	2E4118
258	6C	Beans-dry-blackeye peas/cowpea	5.000000	1.000	1.000	P	2E4118
259	6C	Beans-dry-garbanzo/chick pea	5.000000	1.000	1.000	P	2E4118
260	0	Asparagus	0.500000	1.000	1.000	P	8E3648
262	3	Onions-green	0.200000	1.000	1.000	P	8E3676
264	0	Bamboo shoots	0.200000	1.000	1.000	N	9E6003
265	15	Barley	20.000000	1.000	1.000	P	2E4118
266	15	Corn grain-endosperm	1.000000	1.000	1.000	P	8F3673
267	15	Corn grain-bran	1.000000	1.000	1.000	P	8F3673
268	15	Corn grain/sugar/hfcs	1.000000	1.500	1.000	P	8F3673
269	15	Oats	20.000000	1.000	1.000	P	6E4645
270	15	Rice-rough (brown)	0.100000	1.000	1.000	P	8E2122
271	15	Rice-milled (white)	0.100000	1.000	1.000	P	8E2122
272	15	Rye-rough	0.100000	1.000	1.000	P	8E2122
273	15	Rye-germ	0.100000	1.000	1.000	P	8E2122
274	15	Rye-flour	0.100000	1.000	1.000	P	8E2122
275	15	Sorghum (including milo)	15.000000	1.000	1.000	P	8F3672
276	15	Wheat-rough	20.000000	1.000	1.000	P	8E2122
277	15	Wheat-germ	20.000000	1.000	1.000	P	8E2122
278	15	Wheat-bran	20.000000	1.000	1.000	P	8E2122
279	15	Wheat-flour	5.000000	1.000	1.000	P	8E2122
280	15	Millet	0.100000	1.000	1.000	P	8E2122

282	1A	Sugar-beet	10.000000	1.000	1.000	P	7F04886
283	O	Sugar-cane	2.000000	1.000	1.000		
284	O	Sugar-cane/molasses	30.000000	1.000	1.000	P	9H5196
286	15	Buckwheat	0.100000	1.000	1.000	P	8E2122
287	6C	Guar beans	5.000000	1.000	1.000	P	2E4118
289	15	Corn grain-oil	1.000000	1.000	1.000	P	8F3673
290	O	Cottonseed-oil	15.000000	1.000	1.000	P	8E2122
291	O	Cottonseed-meal	15.000000	1.000	1.000	P	8E2122
292	O	Flax seed	4.000000	1.000	1.000	N	0OND0025 (\$18)
293	O	Peanuts-oil	0.100000	1.000	1.000	P	0F2329
294	O	Safflower-seed	0.100000	1.000	1.000	N	9E6003
295	O	Safflower-oil	0.100000	1.000	1.000	N	9E6003
296	O	Sesame-oil	0.100000	1.000	1.000	N	9E6003
297	6A	Soybeans-oil	20.000000	1.000	1.000	P	5F1536
298	O	Sunflower-oil	0.100000	1.000	1.000	P	6F3408
299	O	Coconut-oil	0.100000	1.000	1.000	P	2F2680
300	O	Olive oil	0.200000	1.000	1.000	P	3E2929
301	O	Canola oil (rape seed oil)	10.000000	1.000	1.000	N	2E4118
302	O	Palm oil	0.100000	1.000	1.000	P	6H5115
303	6A	Soybean-other	20.000000	1.000	1.000	P	5F1536
304	6A	Soybeans-mature seeds dry	20.000000	1.000	1.000	P	5F1536
305	6A	Soybeans-flour (full fat)	20.000000	1.000	1.000	P	5F1536
306	6A	Soybeans-flour (low fat)	20.000000	1.000	1.000	P	5F1536
307	6A	Soybeans-flour (defatted)	20.000000	1.000	1.000	P	5F1536
310	O	Peppermint	200.000000	1.000	1.000	P	4E4404
311	O	Peppermint-oil	200.000000	1.000	1.000	P	4E4404
312	O	Spearmint	200.000000	1.000	1.000	P	4E4404
313	O	Spearmint-oil	200.000000	1.000	1.000	P	4E4404
315	O	Grapes-wine and sherry	0.200000	1.000	1.000	P	3E2930
325	M	Beef-kidney	4.000000	1.000	1.000	P	4F4312
326	M	Beef-liver	0.500000	1.000	1.000	P	0F2329
331	M	Goat-kidney	4.000000	1.000	1.000	P	4F4312
332	M	Goat-liver	0.500000	1.000	1.000	P	0F2329
334	M	Horsemeat	4.000000	1.000	1.000	P	4F4312
339	M	Sheep-kidney	4.000000	1.000	1.000	P	4F4312
340	M	Sheep-liver	0.500000	1.000	1.000	P	0F2329
345	M	Pork-kidney	4.000000	1.000	1.000	P	4F4312
346	M	Pork-liver	0.500000	1.000	1.000	P	0F2329
349	F	Fish-shellfish	3.000000	1.000	1.000	P	3F2956
351	F	Fish-roe/caviar	0.250000	1.000	1.000	P	9F2163
352	F	Fish-finfish/freshwater	0.250000	1.000	1.000	P	9F2163
353	F	Fish-finfish/saltwater (incl. tu	0.250000			P	9F2163
354	F	Fish-finfish/saltwater-dried	0.250000	1.600	1.000	P	9F2163
356	P	Turkey-giblets (liver)	0.500000	1.000	1.000	P	0F2329
361	P	Poultry-other-giblets(liver)	0.500000	1.000	1.000	P	0F2329
363	P	Eggs-whole	0.050000	1.000	1.000	N	9F5096
364	P	Eggs-white only	0.050000	1.000	1.000	N	9F5096
365	P	Eggs-yolk only	0.050000	1.000	1.000	N	9F5096
366	P	Chicken-byproducts	1.000000	1.000	1.000	N	9F5096
367	P	Chicken-giblets(liver)	1.000000	1.000	1.000	N	9F5096
377	11	Apples-juice-concentrate	0.200000	3.900	1.000	P	6F1861
378	O	Bananas-juice	0.200000	1.000	1.000	P	9F2223
379	1A	Sugar-beet-molasses	10.000000	1.000	1.000	P	7F04886
380	13A	Blackberries-juice	0.200000	1.000	1.000	P	3E2930
381	19B	Pepper/black	7.000000	1.000	1.000	N	9E6003
382	1AB	Burdock	0.200000	1.000	1.000	P	7F2016
383	5B	Cabbage-savoy	0.200000	1.000	1.000	P	8E2122
384	4B	Celery juice	0.200000	1.000	1.000	P	8E2122
385	P	Chicken-giblets (excl. liver)	1.000000			N	9F5096
386	9B	Christophine	0.500000	1.000	1.000	P	3E2845
387	O	Coconut-milk	0.100000	1.000	1.000	P	2F2680
388	15	Corn grain/sugar-molasses	1.000000	1.500	1.000	P	8F3673
389	O	Cranberries-juice-concentrate	0.200000	3.300	1.000	P	0E2421
392	O	Grapes-juice-concentrate	0.200000	3.600	1.000	P	5F1560
393	O	Guava-juice	0.200000	1.000	1.000	P	1E2443
395	O	Jobo	0.200000	1.000	1.000	N	9E6003
397	9B	Okra/chinese (luffa)	0.500000	1.000	1.000	P	3E2845
399	15	Oats-bran	20.000000	1.000	1.000	P	6E4645

400 0	Palm hearts	0.200000	1.000	1.000	N	9E6003
401 0	Passion fruit-juice	0.200000	1.000	1.000	P	9E3715
402 12	Peaches-juice	0.200000	1.000	1.000	P	260044
404 11	Pears-juice	0.200000	1.000	1.000	P	6F1861
405 6B	Peas-succulent/blackeye/cowpea	5.000000	1.000	1.000	P	2E4118
406 0	Pineapples-juice-concentrate	0.100000	6.300	1.000	P	2F2634
407 1AB	Radishes-japanese (daiken)	0.200000	1.000	1.000	P	7F2016
408 15	Rice-bran	0.100000	1.000	1.000	P	8E2122
409 15	Rice-wild	0.100000	1.000	1.000	P	8E2122
410 12	Apricot juice	0.200000	1.000	1.000	P	260044
413 6A	Snowpeas	5.000000	1.000	1.000	N	2E4118
414 0	Soursop-juice	0.200000	1.000	1.000	P	9E3754
415 9B	Squash-spaghetti	0.500000	1.000	1.000	P	3E2845
416 0	Strawberries-juice	0.200000	1.000	1.000	P	3E2930
417 0	Sunflower-seeds	0.100000	1.000	1.000	P	6F3408
418 2	Sweet potatos-leaves	0.200000	1.000	1.000	P	8E2122
420 10	Tangerines-juice-concentrate	0.500000	7.350	1.000	P	4F4338
423 8	Tomatoes-dried	0.100000	14.300	1.000		
426 M	Veal-kidney	4.000000	1.000	1.000	P	4F4312
427 M	Veal-liver	0.500000	1.000	1.000	P	0F2329
431 14	Walnut oil	1.000000	1.000	1.000	P	7F1893
436 9A	Watermelon-juice	0.500000	1.000	1.000	P	3E2845
437 15	Wheat-germ oil	20.000000	1.000	1.000	P	8E2122
439 9B	Wintermelon	0.500000	1.000	1.000	P	3E2845
441 10	Grapefruit-juice-concentrate	0.500000	8.260	1.000	P	4F4338
442 10	Lemons-juice-concentrate	0.500000	11.400	1.000	P	4F4338
443 10	Limes-juice-concentrate	0.500000	6.000	1.000	P	4F4338
447 4A	Chervil	0.200000	1.000	1.000	P	8E2122
448 10	Grapefruit peel	0.500000	1.000	1.000	P	4F4338
450 1AB	Ginseng	0.200000	1.000	1.000	P	7F2016
451 5A	Broccoli-chinese	0.200000	1.000	1.000	P	8E2122
452 5B	Bok choy	0.200000	1.000	1.000	P	8E2122
467 19B	Celery seed	7.000000	1.000	1.000	N	9E6003
480 0	Plantains-green	0.200000	1.000	1.000	P	9F2223
481 0	Plantains-dried	0.200000	3.900	1.000	P	9F2223
483 0	Chayote	0.200000	1.000	1.000	P	7F2016
484 0	Radishes-oriental	0.200000	1.000	1.000	P	7F2016
491 0	Arugula	0.200000	1.000	1.000	P	8E2122
492 0	Radicchio	0.200000	1.000	1.000	P	8E2122
493 0	Tarragon	2.000000	1.000	1.000	N	9E6003
494 0	Saffron	7.000000	1.000	1.000	N	9E6003
495 0	Cilantro	7.000000	1.000	1.000	N	9E6003
497 9B	Balsam pear	0.500000	1.000	1.000	P	3E2845
498 4A	Amaranth	0.200000	1.000	1.000	P	8E2122
892 0	Chrysanthemum	0.200000	1.000	1.000	P	8E2122
940 0	Peanuts-hulled	0.100000	1.000	1.000	P	0F2329

Attachment 2: Glyphosate Chronic DEEM™ analysis.

U.S. Environmental Protection Agency Ver. 7.075
 DEEM Chronic analysis for GLYPHOSATE (1989-92 data)
 Residue file name: C:\deemepa\417300.rs7 Adjustment factor #2 NOT used.
 Analysis Date 07-27-2000/13:26:38 Residue file dated: 07-27-2000/13:24:12/8
 Reference dose (RfD, Chronic) = 2 mg/kg bw/day
 COMMENT 1: 8F04973, 9F05096, 9F06007, 9E06003, and OOND0025

Total exposure by population subgroup

Population Subgroup	Total Exposure	
	mg/kg body wt/day	Percent of Rfd
U.S. Population (total)	0.030074	1.5%
U.S. Population (spring season)	0.029120	1.5%
U.S. Population (summer season)	0.030214	1.5%
U.S. Population (autumn season)	0.031604	1.6%
U.S. Population (winter season)	0.029235	1.5%
Northeast region	0.030623	1.5%
Midwest region	0.030323	1.5%
Southern region	0.029108	1.5%
Western region	0.030852	1.5%
Hispanics	0.027409	1.4%
Non-hispanic whites	0.030324	1.5%
Non-hispanic blacks	0.030373	1.5%
Non-hisp/non-white/non-black	0.029878	1.5%
All infants (< 1 year)	0.061663	3.1%
Nursing infants	0.027185	1.4%
Non-nursing infants	0.076174	3.8%
Children 1-6 yrs	0.064651	3.2%
Children 7-12 yrs	0.043174	2.2%
Females 13-19 (not preg or nursing)	0.025547	1.3%
Females 20+ (not preg or nursing)	0.021161	1.1%
Females 13-50 yrs	0.022340	1.1%
Females 13+ (preg/not nursing)	0.022276	1.1%
Females 13+ (nursing)	0.030459	1.5%
Males 13-19 yrs	0.030281	1.5%
Males 20+ yrs	0.025578	1.3%
Seniors 55+	0.021805	1.1%
Pacific Region	0.030384	1.5%

13544

004508

Chemical: Glyphosate, isopropylamine salt; Glyphosate (ANSI)

PC Code: 103601; 417300
HED File Code 11000 Chemistry Reviews
Memo Date: 07/31/2000
File ID: DPD267589
Accession Number: 412-01-0123

HED Records Reference Center
03/20/2001